OBSERVATIONS ON THRIPS.

WITH DESCRIPTION OF A NEW SPECIES.

By Tarlton Rayment, F.R.Z.S.

(Plates xxii–xxiii.)

In 1935, in my monograph, *A Cluster of Bees*, p. 488, I drew attention to the fact that I had found Thrips sheltering through the winter and feeding on the pollen-stores in the nests of certain wild-bees.

During the last week of July, 1946, I received yet another "nest" of a solitary wild-bee, a very small black one with pale yellow markings, *Hylaeus nubilosus mediostictus* Ckll. It contained larvae and pupae in transparent oval skin cells, of extremely delicate structure, and each of which measured some 11 mm. in length, with a diameter of 4·5 mm.

Seven cells were built in a tube excavated in a twig of Wattle, and were collected at Lane Cove, near Sydney, New South Wales, by Norman W. Rodd, who has sent many other interesting specimens. The nest is a typical one for the *Hylaeidae*, and in one gallery was the deserted skin cell of a bee, and which contained the remnants of the original pollen-pudding provided by the industrious honey-gatherer. In this cell were several large thrips feeding on the remnants of pollen, but all were at the wingless (apterous) stage. The specimens are of a distinctive form, and somewhat anomalous, since the six tarsi are each armed with a pair of claws. Moreover, the abddomen at this stage is white, with numerous reddish-brown maculae dotted over the surface.

In the gall-making genera, *Cladothrips* and *Phloeothrips*, the anterior feet are armed with strong claws. Froggatt, investigating one species of these, counted over 1,000 immature thrips, together with the mother, in a single gall.

The Lane Cove specimen should, perhaps, be regarded as the type specimen of a new species, and in this paper I shall refer it to *Cladothrips* and append the specific description.

More than 70 species of thrips are known in Australia, and the study of them is very important for the economic entomologist, since the insects constitute a serious menace to the economy of man, for vast hordes attack his crops and gardens and inflict heavy losses. Any contribution to our knowledge of the thrips is, therefore, to be warmly welcomed.

The habits of certain species are such that it is almost impossible to suggest any remedial measures which would be effective in controlling their numbers. It is obvious that no poison spray could possibly reach galleries excavated in dry trees and occupied by wild-bees. Ensconced in such protected havens, the thrips can rest and feast in peace on the pollen-stores of the bees.

I have discovered pest thrips sheltering from the heat of summer in the tightly-fitting sheaths of green grass stalks, and even there the insects would be effectively protected from poison sprays, since they suck the sweet juice out of the unexposed stems. Frankly, I do not believe that measures such as spraying will ever control thrips, for they cannot be effective in the field. The untold miles of Cape Weed, *Cryptostemma calendulaceum*, flourishing throughout Australia, constitute a vast feeding ground carrying unlimited amounts of pollen. It would appear that we can, therefore, abandon all thoughts of control by poison sprays and concentrate on discovering a fungus, a mould, a bacterium, or some other microscopic form of life that could be used as a biological control by infecting a number of thrips and then releasing them to infect others with which

they come in contact. That method, of course, connotes a much better knowledge of the biology of the thrips than we possess at the present day, and the phenomenon of parthenogenesis further complicates the problem. The time given by authors for the development from egg to adults varies in a striking manner—from a few days to several weeks.

Certain females have a serrated ovipositor to cut narrow channels in living vegetable tissue, and the minute, somewhat oval, eggs are inserted in the wounds, whence, later, the nymphs will emerge and immediately seek a hiding place in buds, leaf-sheaths, or any other close shelter that offers.

The young thrips of the remarkable *Kaleidothrips inquilinus* Kelly and Mayne* which I reared from the hollow stems of dock plants (a weed species of *Rumex*, in the family POLYGONACEAE) were coral-pink in colour, and at the apterous stage, but the young of some other species are colourless. The adults are winged.

The native thrips are frequently collected on the indigenous wattles, for Bagnell often mentions this association, and no doubt the abundant rich pollen of the *Acaciae* is a strong attraction. Strangely, the pest thrips are the species introduced from overseas.

The metamorphosis of thrips is incomplete, for the young ones bear a close resemblance to the imagines, although the wings do not appear until after the fourth and final moult. Not all species, however, have winged forms.

Hinds states that the life of a thrips does not exceed twelve months, but other authors assert that there are several broods each year, and it is well demonstrated that many generations are produced by parthenogenesis, that is, the females have the prerogative of reproducing the species without a copulation with the male, and this probably accounts for the fact that far more females than males are taken by collectors.

Thrips are in the order THYSANOPTERA,† with two sub-orders, TEREBRANTIA and TUBULIFERA, and the new species is included in the latter sub-order, since the apex of the abdomen terminates in a short tube, as will be seen from the illustrations. The species in the first sub-order all lack the tube-like segments, and the females have a curved ovipositor. There is but one family, PHLOEOTHRIPIDAE, in the TUBULIFERA.

The four narrow wings are closely fringed with long hair; the head is long and narrow, with two small compound eyes; two ocelli appear in the winged forms. Many of the species are only a millimetre or so in length, but *Idolothrips spectrum* Hal. is the largest, being nearly half an inch in length.

The new species, too, is a large one, and easily identified by the maculated white young ones; the long third segment of the antennae; the pair of huge claws on the anterior legs; and the great femora of the male.

Later, in November of the same year, Norman Rodd sent a beautifully complete series of this thrips containing numerous eggs, immature larvae at various stages, and adult males and females.

The insects were inhabiting twigs of a species of *Acacia* that apparently had been chambered by some other species. The sticks averaged 5 mm. in diameter, and the "bore" measured 3 mm. in diameter, the longest being 5 cm. Since the

* In Kelly and Mayne's "Catalogue of Australian Thrips", 1934, my signature has been erased from the original plate of this species, and the initials "F.M." have been substituted for it—a piece of deliberate plagiarism rarely encountered in scientific work.—T.R.

† The bladder-like process of the normal foot is responsible for the alternative name, PHYSAPODA.

base of the lumen was closed with a thick wad of teased-out wood fibre, and the upper end with an iris of finer, more closely compacted material, the galleries probably had been excavated originally by one of the reed-dwelling bees in the genus *Exoneura*.

The numerous cylindrical white eggs are disposed in close but irregular order, and lack the beautiful hexagonal sculpturing of bees' eggs. They are just scattered masses on the walls of the lumen of the tube that had been reduced to a thin shell, a mere millimetre or two in thickness. The total number of eggs could not be ascertained, owing to the twigs being broken, but it must have been very large, since numerous females were present. The eggs measured 875 microns at the long axis and 300 microns at the short. The incubating period is unknown, but the eggs turn blackish just before the larvae emerge.

The very pale young ones have somewhat the appearance of Acarid mites, but as they develop become whiter and conspicuously maculated with madder-brown colour, as I have already described.

The adults, however, are jet black and shining, and the winged ones have the four sub-equal heavily-fringed wings of the genus. The most prominent feature of the apterous male forms are the huge anterior legs with the truly gigantic burrowing-claws of the gall-making *Cladothrips*. All the median and hind tarsi have the bladder-like organs of typical thrips. These are shown in Plate xxiii, fig. 14.

Norman Rodd has made many fine contributions to natural history by extending our knowledge of Australian thrips, while his valued collections of the "nests" and larvae of *Exoneurae* have clearly established the relationships of these fascinating Australian bees with the no less interesting *Allodape* of South Africa. Without his zealous assistance my taxonomic studies of these bees would have lacked the conclusive evidence afforded by the remarkable larvae.

It is a matter for regret that my attempts to rear the new species of thrips to the winged stage were not successful, but further efforts to do so will be made during the approaching summer. A synthetic pollen, which I compounded for the honey-bees of the commercial apiaries, is proving successful in rearing other pollen-eating insects.

Order THYSANOPTERA.
Suborder TUBULIFERA.
Family PHLOEOTHRIPIDAE.
Cladothrips punctatus, sp. nov.
(Plates xxii–xxiii.)

Female larva. Length, 3 mm. approx.

Head, prothorax, legs and tube blackish-brown, the abdomen white, with numerous reddish-brown maculae on each segment, from each of which issues a long strong seta; the head long and narrow. The third segment of the antenna is the largest, as in *Kellyia* and *Tetraceratothrips* Bagn., the minute seventh apical segment is distinct from the sixth.

Apical tube short, as in *Phaulothrips*, and fringed with long setae alternating with short curved ones, as in *Kaleidothrips inquilinus* Kelly.

All tarsi bear a pair of apical claws and a long seta, but the slender anterior tarsi and femora are unarmed, as in *Adiaphorothrips*.

The measurements in microns are approximate: width of abdomen, 750; length of head, 425; width, 189; total length of antennae, 1,000; segment one, 75; two, 140; three, 348; four, 189; five, 130; six, 70; seven, 48; length of two apical segments of abdomen, 600; length of tarsal seta, 70.

Type, adult female. Length, 5·5 mm.; width of abdomen, 1 mm. Black. Head, 1 mm. in length, is somewhat longer than the tube. Thorax 1 mm. long, the two sub-equal wings heavily fringed in the winged forms. Antennae as described for the maculated stage.

Abdomen elongate, each segment having two setae laterally. The tube is minutely and densely punctured; the apex having short curved setae alternating with much longer ones. The rest of the body is shining and impunctate.

Anterior tarsi with small claws in the female, but in the male the huge femora and claws are very distinctive.

Locality: Lane Cove, Sydney, New South Wales; July and November, 1946.

Collector: Norman W. Rodd, in "nests" of wild-bees built in dry twigs of *Acacia*.

Type specimens and co-types, mounted in "Euparel", in the collection of the author.

EXPLANATION OF PLATE XXII.

1. Dorsal view of larval *Cladothrips punctatus* Rayment. Note the maculated abdomen.
2. Apical segments of the abdomen showing the microscopic organs at "A".
3. Organ at "A" more highly magnified.
4. The third segment of the antennae is the longest.
5. The arrangement of the setae on the margin of the tube.
6. Each of the apical segments of the tarsi has a pair of hooks, and what appears to be an empodium and a seta, instead of the typical bladder-like organ.
7. The silvery skin cells of a Hylaeid bee, and in which the thrips were feeding.
8. Portion of the integument showing macula and seta.

EXPLANATION OF PLATE XXIII.

9. A twig of *Acacia* showing eggs on the lumen of the tube.
10. The large egg lacks sculpture on the chorion.
11. The young larval thrips has a pale abdomen.
12. The huge anterior legs and claws of the male.
13. Adult female thrips with heavily fringed wings.
14. Compare the huge claws of the male with the small ones of the female.
15. The tube of the female is finely and closely punctured; the rest of the body is impunctate and shining.